

Development of Early Childhood Science Literacy E-Modules *Base Learning Project Method*

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Abstract

Learning science Not yet held optimally in Kindergarten Because Not yet availability of facilitating learning media child For carry out activity learning. This is also based on that based on results Pisa 2022 with the score dropped from year Previously, it was caused by facilities learning and learning media used. The main purpose study This is For developing method project literacy science. Literacy science based _ The *base learning project* is a centered learning model to child, so educator as facilitator. Types of research This use *preliminary research* which is part from study This is the model used is adopted development from Borg & Gall. Instruments used questionnaires and guidelines observation. Subjects involved _ are teacher and child age early childhood aged 5-6 years, totaling 14 children. Analysis done with method percentage, results analysis explained based on formulas and processing in data collection, planning, development draft product, and testing as well as revision from test results that have been carried out done. The implications can used in activity diverse and interesting learning _ with literacy science.

Keywords: *e-module literacy science; project base learning; early childhood*

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Introduction

Literacy is part from one _ element important in progress a country in the era of globalization in do development and strengthening activity literacy. This being one _ must for Society for control scope accomplished learning one of the Merdeka curriculum element namely Omelette basic literacy, mathematics, science, technology, engineering and the arts which include ability various information and communicate in activity. Component from The Merdeka curriculum includes that is approach learning, methods learning the implications to child age early especially in activity learning. (*Ministry of Education and Culture, 2022*) .

Introduction science as part from development cognitive ability _ given to children, but in its implementation in early childhood education science new limited to theory and memorization (Poerwati et al., 2021) . Introduction to children age early will can more effective with implement the right ones, which don't only child learn draft science but discover and experience knowledge That Alone during the learning process. Science education This as education _ whole responsible take responsibility and play a role important in produce and form child For own ability think critical, logical, creative, innovative and possessive Power competitiveness (Widayati et al., 2020) . Effectiveness in introduction science since child age

early namely child like observe and try understand phenomenon, exploration since beginning will push understanding more concept well later day, child capable understand draft scientific and thinking scientific (Pereira et al., 2020)

According to Stone & Conrad, 2017, children who have literacy science is capable child apply his knowledge For solve every problems encountered _ in accordance with context (Widayati et al., 2020). Science Literacy addressed For know ability child in respond issues science with use ideas scientific (Aditomo & Faridz, 2019) . Scope from science literacy This No just on ability child in controlling cognitive processes and abilities solution the problem in a way personal, however more from that, that is about ability child in solve problem social in a way scientific (Sholeha et al., 2021).

Science complies Charlesworth, (2015) state that skills that provide information For information new through observation, child get Skills base observing, comparing, classifying, measuring and communicating For required skills _ child For facing life daily.

one of reference used _ government For measure ability literacy in Indonesia is results research Program for International Student Assessment (PISA) which is studies international four annual about performance literacy reading, mathematics, and science in children school (OECD, 2019). Indonesia 's 2018 PISA results show that Indonesia is down Again to ranked 72nd out of 78 countries. PISA literacy results in 2018 experienced significant decrease _ compared to PISA results in 2015. Decline the most literacy shown in literacy reading 371, literacy math 379, and followed literacy science 396 (Amini & Sinaga, 2021).

Literacy results science in 2022 yage score his down in literacy that becomes reference important for educator specifically educator in increase literacy science child. Various effort enhancement quality education, especially supportive ones enhancement literacy science child educate, have Lots done. The low ability literacy Indonesian children can influenced by several things, like curriculum, use of learning models, facilities learning, and teaching (Amini & Sinaga, 2021).

One of method For increase quality learning in Indonesia is with introduce literacy science to child as early as Possible. Literacy science is solution For face challenge 21st (Firda & Suharni, 2022). Research results (Marliza & Eliza, 2019) state that study This show exists enhancement science process skills implemented child _ cycle I percentage 40.0% and cycle II proportion 93.3%. so that can concluded that learning child in science process skills can improved in very enjoyable learning.

One step is done For activity learning in children that is activity projects carried out directly by Naka start from planning until evaluation from activities that have been done. Learning based project, or *Base Learning Project* is method problem - focused learning _ complex required _ For investigate and understand lesson. This model is also purposeful For guide child in project collaborative integration _ various learning that provides chance for child For explore in a number of method that is meaningful for self they yourself and do it experiment collaborative (Belwal et al., 2020).

Through application Learning Based Project, as learning as a medium in the learning process For reach competence attitudes, knowledge and skills (Chounta et al., 2017); (Dumitrescu et al., 2014); (Marzuki & Basariah, 2017). With exists learning based project (*Project Based Learning*) will more effective For increase train plan, execute activity in accordance with plan and can present existing projects _ carried out in activities learning (Logan et al., 2021) ; (Mutakinati et al., 2018).

E-module that can used For develop literacy science that is module packaged electronics (e-modules). with approach based Base Learning Project. E-module that is can developed become multimedia form. Design the e- module can come to be preparation for teachers to activity Study child in a way independent and collaborative in solve the problem Alone after do stages (Kumalasani, 2020). One of the media used in develop literacy science child age early is shaped module packaged electronics become A completed teaching module project (*based learning project* method project can give chance to child For express pattern

thinking, skills and abilities maximize problems faced so that will develop himself as much as possible (Muji et al., 2022).

Research result (Sativa & Eliza, 2023) state that Development of E-Module for Early Childhood Science Literacy resulting in products in the form of an e- module based learning project. Although Not yet is known its effectiveness, module This can become reference for educator preschool For develop literacy science in children age early. Guidelines This important For introduced to educators so that they own addition understanding How the right way For implement literacy science. Implications results study This can used by educators For give Diverse and challenging activities _ especially related with science. Difference with research This with objective target intended use of e - modules to preschool teachers, especially those who teach child age early. In other words, actually with method learning literacy For child age early Already There is teachers use, however learning based project can role active child in his knowledge Alone through making something project that will become A draft so that child can demonstrate direct the theory he obtained in his life. Difference with previous research _ that target the use of the e module will be addressed to teachers who teach children after 5-6 years. With can increase results learning, ability think critical, and motivational read and operate it (Wahyuni, 2021).

Related references and methods _ learning science For child age early Already Enough Lots discovered by the teacher, but related literacy science just only very minimal inside activity learning to be teachers use in activity learning (Şentürk, 2017). However reality that No all teachers who believe self will sufficient knowledge _ about literacy science This as well as implies it in the e- module that can used (Vahey et al., 2019). With exists problem This so researcher do e- module development. So research This aim For produce e- modules based effective, efficient and interesting base learning project For increase ability literacy science in children age early.

Methodology

Study is *Preliminary research* is a researcher use in research to be done. The data obtained will produce product certain ones can its effectiveness was tested. Development model used _ is adopt Borg & Gall approach (Figure 1). The product will developed then tested for suitability with validity tests and trials product For know benefit product can increase ability literacy science in children age early.

Subject study namely teachers and children aged 5-6 years at the Bhakti Pediatrica Kindergarten, Payakumbuh City. Data collection techniques for research. This use observation namely technique data collection used For see seraca direct documentation is method used. For take portfolio from activities and instruments used is questionnaire containing indicators used _ researcher. Then questionnaire validated by experts material, expert language and media expert. Indicator that will validated containing from graphics, presentation, suitability content, language that is complete and appropriate with material, systematic from side material and suitability of e- modules based base learning project for develop literacy science in children age early. Questionnaire in using e- module shaped scale likert with direct provide the answer will be on the side by each expert. Results from score evaluation from every choice answer seen in **Table 1**. With results end from assessment of the hali concluded with formula in **Figure 2** and **Table 2**. Meanwhile For criteria validation or The level of achievement that will be achieved used in combining e- modules literacy science is described in **Table 2**.



Chart 1. Steps Study

In the guidelines observations used For see the trial scale limited when the product is implemented by teachers and children. The next step stated to be valid and practical Then testing was carried out field in a way limited. Test try carried out in groups small totaling 14 children. During stage implementation, the process of analyzing the deficiencies in the product literacy science done revision. Stage final that is revision product based on results from testing limited.

Table 1. Expert Assessment Scores

Category Evaluation	Value (Score)
Very interesting	5
Interesting	4
Enough Interesting	3
Less attractive	2
Very Uninteresting	1

The formula as following :

$$P = \frac{\sum R}{N} \times 100\%$$

Information:

P = Percentage of score sought

$\sum R$ = Number of answers given by validators/selected options

N = Maximum or ideal score

Figure 2. Formula Evaluation Validation

Table 2. Criteria Validation and Practicality

No	Tier Achievability	Criteria	Information
1	81-100%	Very good	Very feasible / practical
2	61-80%	Good	Feasible/ practical
3	41-60%	Pretty good	Not feasible / practical
4	21-40%	Not good	Not feasible / practical
5	<20%	Not very good	Very not feasible / practical

Results and Discussion

Based on results data analysis There is in research This can explained based on formulation and processing at stages (1) Data collection; (2) Planning; (3) Development draft product; Test try and revise test results. Obtain displayed the stages as following:

Stages Data collection

Learning and recognition about literacy science is very important since age early For develop self - knowledge and skills child. Based on results observation found that ability literacy science child 5-6 years old is at the attainment category low. One of factors that can cause that influence condition school and teacher experience in stage activity learning. Study previous state that Still many teachers don't own believe self For teach science to children in activities learning, reasons that is draft about science not enough understand and how implement it No suitable for children (Kallery et al., 2009). Conditions that create a lack of awareness children have about various existing scientific processes (Allen & Kambouri-Danos, 2017). In other words, the introduction of science from an early age helps children explore the various possibilities that children can actually experience. Information obtained new child will can own deep rich knowledge his life. So that can give experience new to child at each activity

learning at school so that child will have enthusiasm and motivation For follow activities performed (Dejonckheere et al., 2016)

Based on results observations that have been made done that school use Merdeka curriculum in activities learning. With use Merdeka curriculum educates and teaches child in accordance with characteristics environment the child 's school and abilities. Implementation Merdeka curriculum is also implemented Pancasila values so can create a smart, superior and noble child. Merdeka Belajar is a policy program new program launched by the Ministry of Education and Culture Republic of Indonesia (Kemendikbud RI) which was launched by the Minister of Education and Culture of the Republic of Indonesia, the Advanced Indonesia Cabinet. Essence independent Study is independence think and act in activity learning. Children are given freedom For express and explore ideas, ideas and imagination in discussion nor work. Presentation learning for child age early must prioritize packaged processes in activity play and games. Age child early carry out activity Study while play, and play while Study. With thereby child always like, comfortable and independent in Study.

Stage Planning

Based on analysis carried out step furthermore start make design product that will suitable development _ For overcome problems found in children _ age early. The e- module structure used by researchers arranged containing _ about draft literacy science and its implementation in children. Goals and Achievements Development too noticed For preparation activity appropriate learning with Merdeka curriculum used. Minister of Research, Technology and Higher Education's decision Number 56 of 2022 concerning guidelines application curriculum has explain that structure curriculum independence in education child age early contains two things ie activity learning intracurricular and projects adoption profile Pancasila students. Focus on structure curriculum project strengthening profile Pancasila students, PAUD institutions are mandatory know and implement learning based project. Form learning based project classified become four theme activity general that is theme I love the earth, me love Indonesia, play and work the same, as well theme my imagination. Fourth theme the aim For ensure that every implemented project _ can internalize mark mark profile Pancasila students in PAUD children. This matter in line with study previous that implementation Early Childhood Science Based Learning Independent Curriculum in Kindergarten Regency South Cikarang. Can be concluded That Early Childhood Science Based Learning Independent Curriculum in Kindergarten Regency South Cikarang Viewed from _ instrument 1). observe, 2) classify, 3) estimate and 4) compare. Based on results study seen that Analysis Implementation Early Childhood Science Based Learning Independent Curriculum in Kindergarten Regency South Cikarang has implemented with Good (Rahmi & Muchlisin, 2022).

This is also in line with study previous namely that learning use module can give basic knowledge _ in activity Study huga help its use Study in a way independent by the child (Chantarasombat & Rooyuenyong, 2020). In research that has been done done (Yapandi & Jayanti, 2023) which results his research state that decent results _ based on evaluation expert material and children as well as easy used as teaching materials or module in education child age early. Next e- module designed use application called _ canva so more view _ interesting for child every the page. So researchers prepare a number of material to be entered to in the appropriate e - module with title such as appropriate images, materials, logos with content that will made. Simple tools and materials but menarik, with use design simple and easy module _ used for user For read and practice (Smaldino et al., 2008).

E-module This be equipped with activity literacy science based *base learning project* namely make eco enzymes that come from from five organic waste. This is based on to project strengthening Pancasila profile for child age early. Project This developed based on special theme _ For increase achievement Pancasila profiles include dimensions that is believe devout to great god _ one, global diversity. Work together cooperative, creative, independent and

reasoning critical. With theme project profile studied Pancasila which was taken namely nua I Darling earth that is processing rubbish. Processing trash that isn't fulfil standard give rise to various loss, like reduce aesthetics environment, clog drains, making it worse sanitation until spread various type disease (Lemaire & Limbourg, 2019). System processing rubbish through the selection is also stated in regulation Number 81 of 2012 concerning Management Household waste and rubbish _ Kind of rubbish House ladder. In article 17 (1) it is stated that at each sorting waste carried by everyone at the source (Yudhistirani et al., 2016).

Table 3. E-Module Content Structure

Chapter	Subchapter
Cover	1. Title of e- module 2. The learning theme raised
Foreword	Contains information about background back and process general about e- modules
List of contents	Framework about fill in the e- module
Introduction	Base about literacy science based base learning project
Chapter 1	Literacy science child age early
chapter 2	Learning model Base Learning Project
Chapter 3	Activity Literacy science child age early
Chapter 4	Independent Curriculum for Early Childhood
Bibliography	
Profile Mentor and writer	

EcoEnzyme is creative method _ in do management environment and become a model or example creative learning that involves _ children and all existing elements _ at school. Eco Enzyme is a process that can used For identify and provide priorities and issues and problems for environment as well as plan action in management environment (Gustia et al., 2023). Eco Enzyme produces Very friendly enzyme for environment Because originate Drai five rubbish organic House ladder like fruits, vegetables, mixed with brown sugar and water ratio 1:3:10 and undergo a fermentation process for 3 months. Result of fermentation is fluid with color chocolate dark and vinegary aroma or fresh sour that has Lots benefits, including : used as fertilizer, cleaners that are contaminated and can also be used as fertilizer product cleaner House ladder like detergent washer plate (Nurmandari et al., 2019). Management rubbish side fruit and vegetables with eco- fermentation with form results finally eco enzyme which is five zinc draft Limah who gives benefit as fertilizer plant Because Eco enzyme liquid contains microflora that has effective role in improving land status. Implementation eco enzyme activities in learning science child can develop Skills literacy science in children use early Because This activity or innovation the latest to be implemented to child age early in the environment (Larasati et al., 2020).

Development

Stages This development Where can produce e- modules literacy science For child age early in the park decent and practical children used For activity learning. E-module developed and validated by 3 expert validators in accordance with field the study consists of from material validators, media validators and language validators. With results obtained from results validations can be seen on the table 4. Based on input and direction given by to three expert validators so done revised several times or repair in accordance with expert For produces valid e-modules table 4 Existing e-modules stated worthy used so Next, a practicality test on teachers is carried out. The result found that product Already fulfil very practical criteria. After That new testing was carried out to child.

Table 4. Validation Results

No	Criteria Evaluation	Validity	Category
1	Material Aspects	71%	Feasible/ practical
2	Language Aspects	90%	Very feasible/ practical
3	Media Aspect	85%	Very feasible/ practical
Average		82%	Very feasible/ practical

Table 5. Revised Product from expert

No	Revision from Experts	Change	
		Before revised	After revised
1.	Added the logo of the Indonesian Ministry of Education on the cover		
2.	Add Interesting and appropriate pictures and illustrations _ with e- module theme		
3.	Adding suitable Videos For supports e- modules		

First revision presented by Hali media is provide the Kemdiklik logo on halakm cover. Logos are important part origin products made. Provision of one of the Ministry of Education and Culture logos method For used for user that developed products _ of course worthy to be implemented Because Already tested by experts, the logo is also possible efforts _ done claim *branding* to product being developed (Kumar, 2018). Second, add accompanying illustrations and designs with interesting picture so become something interest at a time will increase attractiveness Because with exists picture will introduce and explain medium material studied (Hladíková, 2014). Third that is add suitable videos for e- modules designed that will guide child child For understand something material through visuals, children will too follow activities invited in the video (Suyatna, 2020).

Trial and Revision

After e-module literacy science declared valid by the validator then the existing media testing was carried out Limited scale, carried out in groups small number of 14 children. During the testing process done analysis contained in the e- module. Analysis based on results more observations and discussions carry on with the class teacher child. In line with study previously stated that discussion is one of the chance for child For Can do interaction with his friends and other people around him so that child will capable socialize and can each other exchange ideas (Ying, 2020). Discussion This Can give chance For reveal mind as well as will help in expand knowledge. Therefore, That with Adanaya method this base learning project will give chance more to child For build more knowledge real from environment as well as the kids come too straight away in activities carried out. With thereby method will petrified increase trust self as well as ability think child. Discussion results with the last teacher made A material For revision end product For furthermore effectiveness test was carried out later Table 5).

For perfection product This then the steps taken is a test of effectiveness. This matter be one weakness in the research This. Further research can testing e-modules that have been generated from study can give positive impact to ability literacy science child.

Conclusion

Products produced _ that is in the form of an e- module based base learning project for activity learning in children. Although Not yet reached the stage study the effectiveness of, e- modules this will too become reference for preschool teachers For develop literacy science in children age early. Guidelines This important carried out and carried out to the teacher so own addition reference and understanding the right way For implement literacy science. The implications obtained Darii study Can used by teachers for give various activities _ varied and interesting as well as related challenges _ with science For child age early.

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